GE is testing the average lifetimes of light bulbs under normal usage from two production lines. The results from two samples are below:

<table>
<thead>
<tr>
<th>Type</th>
<th>$n$</th>
<th>$\bar{x}$ (hrs)</th>
<th>$s$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production Line 1</td>
<td>400</td>
<td>708.4</td>
<td>16.5</td>
</tr>
<tr>
<td>Production Line 2</td>
<td>500</td>
<td>690.6</td>
<td>16.2</td>
</tr>
</tbody>
</table>

Let $\mu_1$ be the true average lifetime among all light bulbs from Production Line 1 and let $\mu_2$ be the true average lifetime among all light bulbs from Production Line 2.

Use the data to test whether $\mu_1 = \mu_2$.

State $H_0$ and $H_a$.

$$H_0: \mu_1 = \mu_2 \quad \text{vs.} \quad H_a: \mu_1 > \mu_2$$

Show how to compute the test stat.

What distribution curve do we use?

$$z = \frac{(708.4 - 690.6)}{\sqrt{\frac{16.5^2}{400} + \frac{16.2^2}{500}}} = 16.2$$

Compare on right of $N(0, 1)$ curve

Use the $P$-value to explain your conclusion.

If $\mu_1 = \mu_2$ were true, then there would be no chance of getting $\bar{x}_1 - \bar{x}_2$ of 17.8 or higher with these sample sizes. We have strong evidence to reject $H_0$.

Why can we use a two sample Z-Test when the measurements are not assumed to be normally distributed and we do not even have the true standard deviations?

Because we have large samples.